Concept for Next-Generation Jamming-Resistant GPS

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Introduction

The most logical next step in improving GPS systems, particularly those designed for military use where new end-user units may be manufactured and deployed (necessary in order to make substantial changes to the way in which GPS works) is to change the mode of transmission of electro-magnetic energy from ground units entirely, varying not only aspects of the signal like frequency but to completely change the way in which signals are transmitted.

Abstract

Borrowing from a cutting-edge microscopy technique known as helical dichroism, light sources are shaped in terms of time and space in such a way that emitted light follows a spiral pattern. Where in microscopy this means being able to image proteins in three dimensions (since light can strike a protein from multiple angles in a dynamic way) in satellite communications, this helical structure can be bestowed upon EM. Next-generation satellites could be designed to accept as valid EM signals only if their mode of transmission is helical, meaning that valid signals would pass through multiple layers in a receiver unit and would strike a different part of the receiver at various "depths" inside of the mechanism at expected relative timing. EM associated with jamming would strike all parts of the mechanism at once and could be identified as noise and filtered out. This can be accomplished using existing technology in the form of alternating layers of gold and beryllium and advanced signal processing systems.

Conclusion

Return signals to ground units (relaying computed position information) could be returned using the same helically-shaped EM (in many ways this is the opposite of soliton EM although a different configuration of the same magnets could be used to establish these helical waves) and ground receivers could be similarly equipped to filter out all non-helical EM. In further-improved systems, the relaying of positional information back to the ground units could be sent not by way of EM but by entangled atoms. In this way, only the jamming of ping signals sent from ground stations to GPS satellites would need to be guarded against and not the return signal containing the crucial positional data.